

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellants : Tomohiro Nishi, et al.
Serial No. : 10/085,659
Filed : February 26, 2002
For : OPTICAL STATE MODULATION METHOD AND
SYSTEM, AND OPTICAL STATE MODULATION
APPARATUS
Examiner : Yenke, Brian P.
Art Unit : 2622
Confirmation No. : 8660

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Signature
April 17, 2008
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REPLY BRIEF UNDER 37 C.F.R. § 41.41

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Examiner's Answer dated February 21, 2008, having a two-month statutory period for reply set to expire on April 21, 2008, Appellants submit herewith a Reply Brief.

STATUS OF CLAIMS

The Application was filed with claims 1-23 on February 26, 2002, and assigned Application Serial No. 10/085,659. This application claims the benefit of Japanese Patent Application No. 2001-283180, filed on September 18, 2001, respectively.

The Examiner issued an Office Action on November 26, 2004. In the Office Action, the Examiner rejected claims 1-23 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 6,674,561. In response, Appellants submitted a Terminal Disclaimer on February 28, 2005 thereby obviating the Double Patenting rejection.

The Examiner then issued an Office Action on June 21, 2005. In the Office Action, the Examiner rejected claims 1-23 under a provisional obviousness-type double patenting rejection over claims of copending Application No. 10/385,225. In response, Appellants submitted a Terminal Disclaimer on September 21, 2005 thereby obviating the Double Patenting rejection.

The Examiner then issued an Office Action on November 25, 2005. In the Office Action, the Examiner rejected claims 1-23 under 35 U.S.C. §102(b) as allegedly anticipated by WO 01/33846 to Burstyn (hereinafter, merely "Burstyn"). In response, Appellants submitted an amendment on February 16, 2006 thereby adding the limitation "...a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, in said luminance modulation" to independent claims 1 and 10-23.

The Examiner then issued a Final Rejection on March 7, 2006. In the Office Action, the Examiner rejected claim 1-23 under 35 U.S.C. §103(a) as allegedly unpatentable over Burstyn. In response, on May 24, 2006 Appellants submitted a response traversing the rejections to the claims.

The Examiner issued an Advisory Action on June 8, 2006, maintaining the rejections recited in the Final Office Action and incorporating U.S. Patent No. 6,950,532 to Schumann et al. (hereinafter, merely "Schumann") as further support.

A Notice of Appeal was filed by Appellants on June 28, 2006 with a Pre-Appeal Brief Request for Review. A Notice of Panel Decision from Pre-Appeal Brief was mailed on July 31, 2006.

An Appeal Brief was filed by Appellants on August 31, 2006.

The Examiner issued a first Notification of Non-Compliant Appeal Brief on September 26, 2006. In the first Notification of Non-Compliant Appeal Brief, the Examiner stated that the brief was defective in that the Appellants failed to address the Schumann reference pertaining to the limitation for which the Appellant stated was not taught by Burstyn. Appellants filed a response on October 25, 2006, addressing the Schumann reference.

The Examiner issued a second Notification of Non-Compliant Appeal Brief on November 15, 2006. In the second Notification of Non-Compliant Appeal Brief, the Examiner stated that the brief did not identify independent claims 10-23 to the Specification by page and line number and to drawings. Appellants filed a response on December 14, 2006 to identify corresponding page and line number and to drawings, following requests in the second Notification of Non-Compliant Appeal Brief.

The Examiner issued a third Notification of Non-Compliant Appeal Brief on January 17, 2007. In the third Notification of Non-Compliant Appeal Brief, the Examiner stated that the brief contained an improper heading that were improper under 37 C.F.R. § 41.37. The heading "Group of Claims" was required to be combined with "Arguments". Appellants filed a response on February 16, 2007 to combine "Group of Claims" with "Arguments", following requests in the third Notification of Non-Compliant Appeal Brief.

The Examiner reopened the prosecution and issued an Office Action on June 14, 2007. In the Office Action, the Examiner rejected claims 1-23 under 35 U.S.C. § 103 (a) as being unpatentable over Burstyn in view of Frankowski et al. (disclosed in US 20050035314, paragraph 84, as a reference, herein after merely Frankowski) and Schumann.

Appellants filed an Appeal Brief on December 14, 2007, maintaining the Appeal filed on August 31, 2006.

An Examiner's Answer was issued on February 21, 2008, rejecting claims 1-23 under 35 U.S.C. § 103 (a) as being unpatentable over Burstyn in view of Frankowski et al. (disclosed in US 20050035314, paragraph 84, as a reference, herein after merely Frankowski) and Schumann.

Accordingly, the status of the claims may be summarized as follows:

Claims Allowed:	None.
Claims Rejected:	1-23.
Claims Appealed:	1-23.

The rejected claims 1-23 are set forth in Appendix attached hereto.

Appellants appeal the Rejection of claims 1-23, which constitute all of the currently pending claims in this application.

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Appellants request review of the rejection of:

Claims 1-23 were rejected under 35 U.S.C. § 103 (a) as being unpatentable over Burstyn (WO 01/33846) in view of Frankowski (disclosed in US 20050035314, paragraph 84, as a reference) and further in view of Schumann (U.S. Patent No. 6,950,532).

ARGUMENTS

Claims 1-23 fall into four separate groups:

Group I: claims 1-9; with independent claim 1.

Group II: independent claims 10-12.

Group III: independent claims 13-15, 22 and 23.

Group IV: independent claims 16-21.

The §103 Rejections Should be Withdrawn Because Claim Features are Not Disclosed, Taught or Suggested in the Reference

Independent claim 1 recites, *inter alia*:

“An optical state modulation method comprising:

...utilizing a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, in said luminance modulation.” (emphasis added)

The Examiner's Answer (see page 4) concedes that combination of Burstyn and Shumann does not disclose the conventional capability of a rotatable filter to having a sinusoidal density variation along its circumferential direction, in said luminance modulation. The Examiner's Answer relies on Frankowski to reject the above identified features of claim 1 by specifically citing “a stripe pattern whose luminance changes continuously in the form of a sinusoidal waveform is projected with high accuracy by means of the DMD”. The Examiner's Answer (see page 6) further states that Frankowski uses a DMD and color wheel to project/modulate/filter the light.

Appellants submit that the sinusoidal waveform of Frankowski fails to teach or suggest the claimed features. Indeed, Frankowski's sinusoidal waveform (see pages 92 and 97 of Frankowski) is in the modulated light created through interference, which is in direct contrast with Appellants' claimed a rotate-able filter part having a sinusoidal density variation along its

circumferential direction. Appellants respectfully submit that sinusoidal waveform of the modulated light and a sinusoidal density variation of a filter are two different subject matters.

Appellants respectfully submit that DMD and color wheel of Frankowski fails to teach or suggest the above-identified features. The DMD of Frankowski is for changing direction of the light. The color wheel of Frankowski (see page 97 of Frankowski) is for matching the frequencies of three primary colors with the refresh frequency of one chip DMD. Appellants further submit that nothing in Frankowski discloses or suggests that the color wheel or the DMD has a sinusoidal density variation along its circumferential direction, as recited in claim 1.

Appellants respectfully submit that it is mere speculation that the color wheel can be used for interference pictures. Frankowski (see page 97) discloses “because the stripe projection is based on interferometric concepts only grey-scales of the light intensity is from interest and no color information, ...can be refused on the use of a color wheel in the path of the digital projection system.”

Therefore, claim 1 is patentable.

Claims 10-23 are similar, or somewhat similar, in scope to claim 1 and are therefore patentable for similar, or somewhat similar, reasons.

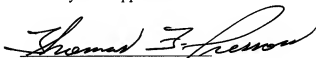
Claims 2-9 are each dependent from one of the independent claims discussed above and are therefore patentable for at least the above-identified reasons.

CONCLUSION

For the reasons discussed above, claims 1-23 are patentable. It is, therefore, respectfully submitted that the Examiner erred in rejecting claims 1-23, and a reversal by the Board is solicited.

Respectfully submitted,
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APPENDIX

CLAIMS ON APPEAL

1. (Previously Presented) An optical state modulation method comprising:
periodically modulating luminance of an original display image in temporal domain to generate an optical state variation on a recorded image that is obtained by image-capturing of the modulated display image,

said optical state variation being independent of said original display image and without generating a hampering effect when said displayed image is directly watched,

utilizing a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, in said luminance modulation.

2. (Original) The optical state modulation method according to claim 1, wherein,

when said luminance modulation is performed based on a sinusoidal waveform, an amplitude and frequency of said sinusoidal waveform are determined to satisfy a first condition,

said first condition being that an amplitude and frequency of said optical state variation in each frame of said recorded image obtained by an image-capturing apparatus correspond to the value equal or more than a temporal frequency contrast sensitivity of human vision determined at the luminance of said original display image.

3. (Original) The optical state modulation method according to claim 2, wherein,

in addition to said first condition, the amplitude of said sinusoidal waveform is determined to satisfy a second condition,

said second condition being that the amplitude of said luminance modulation is equal or less than an amplitude that is obtained from said temporal frequency contrast sensitivity of human vision by setting a frequency component thereof to the frequency of said sinusoidal waveform determined in claim 2 for the luminance of said original display image.

4. (Original) The optical state modulation method according to claim 1, wherein,

when said luminance modulation is performed based on a composite waveform, an amplitude and frequency of at least one of sinusoidal wave components composing said composite waveform are determined to satisfy a first condition,

said first condition being that an amplitude and frequency of said optical state variation in each frame of said recorded image obtained by an image-capturing apparatus correspond to the value equal or more than a temporal frequency contrast sensitivity of human vision determined at the luminance of said original display image.

5. (Original) The optical state modulation method according to claim 4, wherein,

in addition to said first condition, the amplitude of said at least one of sinusoidal wave components is determined to satisfy a second condition,

said second condition being that the amplitude of said luminance modulation is equal or less than an amplitude that is obtained from said temporal frequency contrast sensitivity of human vision by setting a frequency component thereof to the frequency of said at least one of

sinusoidal wave components determined in claim 4 at the luminance of said original display image.

6. (Original) The optical state modulation method according to claim 1, wherein

said luminance modulation is performed by applying different types of luminance modulation on corresponding spatial positions of said original display image.

7. (Original) The optical state modulation method according to claim 1, wherein

said luminance modulation is performed by applying different types of luminance modulation on corresponding time periods.

8. (Original) The optical state modulation method according to claim 1, wherein

said luminance modulation is performed so as to hold a same display luminance in each frame before and after said luminance modulation, said display luminance being a luminance perceived by a audience.

9. (Original) The optical state modulation method according to claim 1, wherein

said optical state variation appeared on said recorded image is a variation in color domain.

10. (Previously Presented) An optical state modulation application system comprising:

a projection type display apparatus projecting a display image onto a screen; and
an optical state modulation apparatus acting on a projection light in an projection light path to apply a periodic luminance modulation in temporal domain on an original display image, wherein

the luminance of said original display image is modulated to generate an optical state variation on a recorded image obtained through image-capturing of the modulated display image,

said optical state variation being independent of said original display image and generating no hampering effect when said modulated display image displayed on said screen is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

11. (Previously Presented) An optical state modulation application system comprising:

a projection type display apparatus projecting a display image onto a screen; and
an optical state modulation apparatus controlling a light source of said display apparatus to apply a periodic luminance modulation in temporal domain to an original display image, wherein

the luminance of said original display image is modulated to generate an optical state variation on a recorded image obtained through image-capturing of the modulated display image,

said optical state variation being independent of said original display image and generating no hampering effect when said modulated display image displayed on said screen is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

12. (Previously Presented) An optical state modulation application system comprising:

a projection type display apparatus projecting a display image onto a screen; and
an optical state modulation apparatus controlling an image signal of said display apparatus to apply a periodic luminance modulation in temporal domain on an original display image, wherein

the luminance of said original display image is modulated to generate an optical state variation on a recorded image obtained through image-capturing of the modulated display image,

said optical state variation being independent of said original display image and generating no hampering effect when said modulated display image displayed on said screen is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

13. (Previously Presented) An optical state modulation application system comprising:

a direct view type display apparatus displaying a display image onto a display screen; and

an optical state modulation apparatus generating an effect on a display light to apply a periodic luminance modulation in temporal domain on an original display image, wherein

the luminance of said original display image is modulated to generate an optical state variation on a recorded image obtained through image-capturing of the modulated display image,

said optical state variation being independent of said original display image and generating no hampering effect when said modulated display image displayed on said display screen is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

14. (Previously Presented) An optical state modulation application system comprising:

a direct view type display apparatus displaying a display image onto a display screen; and

an optical state modulation apparatus controlling a light source of said display apparatus to apply a periodic luminance modulation in temporal domain on an original display image, wherein

the luminance of said original display image is modulated to generate an optical state variation on a recorded image obtained through image-capturing of the modulated display image,

said optical state variation being independent of said original display image and generating no hampering effect when said modulated display image displayed on said display screen is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

15. (Previously Presented) An optical state modulation application system comprising:

a direct view type display apparatus displaying a display image onto a display screen; and

an optical state modulation apparatus controlling an image signal of said display apparatus to apply a periodic luminance modulation in temporal domain on an original display image, wherein

the luminance of said original display image is modulated to generate an optical state variation on a recorded image obtained through image-capturing of the modulated display image,

said optical state variation being independent of said original display image and generating no hampering effect when said modulated display image displayed on said display screen is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

16. (Previously Presented) An optical state modulation apparatus of a luminance modulation application system, wherein:

a periodic luminance modulation in temporal domain is applied to a projection light projected from a projection type display apparatus to generate an optical state variation on a recorded image that is obtained by image-capturing of a displayed image,

said displayed image being an image displayed on a screen to which the modulated projection light is projected,

said optical state variation being independent of an original display image and generating no hampering effect when said displayed image is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

17. (Previously Presented) An optical state modulation apparatus of a luminance modulation application system, wherein:

a periodic luminance modulation in temporal domain is applied to a light source of a projection type display apparatus to generate an optical state variation on a recorded image that is obtained by image-capturing of a displayed image,

said displayed image being an image displayed on a screen to which a projection light from the modulated light source is projected,

said optical state variation being independent of an original display image and generating no hampering effect when said displayed image is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

18. (Previously Presented) An optical state modulation apparatus of a luminance modulation application system, wherein:

a periodic luminance modulation in temporal domain is applied to an image signal of a projection type display apparatus to generate an optical state variation on a recorded image that is obtained by image-capturing of a displayed image,

said displayed image being an image displayed on a screen to which a projection light according to the modulated image signal is projected,

said optical state variation being independent of an original display image and generating no hampering effect when said displayed image is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

19. (Previously Presented) An optical state modulation apparatus of a luminance modulation application system, wherein:

a periodic luminance modulation in temporal domain is applied to a display light of a direct view type display apparatus to generate an optical state variation on a recorded image that is obtained by image-capturing of a displayed image,

said displayed image being an image of the modulated display light of said direct view type display apparatus,

said optical state variation being independent of an original display image and generating no hampering effect when said displayed image is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

20. (Previously Presented) An optical state modulation apparatus of a luminance modulation application system, wherein:

a periodic luminance modulation in temporal domain is applied to a light source of a direct view type display apparatus to generate an optical state variation on a recorded image that is obtained by image-capturing of a displayed image,

said displayed image being an image from the modulated light source of said direct view type display apparatus,

said optical state variation being independent of an original display image and generating no hampering effect when said displayed image is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

21. (Previously Presented) An optical state modulation apparatus of a luminance modulation application system, wherein:

a periodic luminance modulation in temporal domain is applied to an image signal of a direct view type display apparatus to generate an optical state variation on a recorded image that is obtained by image-capturing of a displayed image,

said displayed image being an image according to the modulated image signal of said direct view type display apparatus,

said optical state variation being independent of an original display image and generating no hampering effect when said displayed image is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

22. (Previously Presented) Apparatus for displaying an image, comprising:
a display unit, and

a modulation unit generating temporal modulation in an original image to be displayed on said display unit, wherein

said luminance modulation causes an optical state variation perceivable by a human vision on a recorded image obtained by image-capturing of the modulated original display image, and

said optical state variation causes no substantial visible effect perceivable by the human vision when said modulated original display image is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.

23. (Previously Presented) Apparatus for displaying an image, comprising:

means for displaying an image; and

means for generating temporal modulation in an original image to be displayed, wherein

said luminance modulation causes an optical state variation perceivable by a human vision on a recorded image obtained by image-capturing of the modulated original display image, and

said optical state variation causes no substantial visible effect perceivable by the human vision when said modulated original display image is directly watched, and

a rotation filter, including a rotate-able filter part having a sinusoidal density variation along its circumferential direction, used in said luminance modulation.